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None

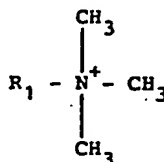
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(54) Composition and process for the treatment and care of the hair

(57) A cosmetic composition suitable for application to the hair comprises a cosmetically acceptable aqueous medium and
- at least one cationic surfactant agent of formula (I):



in which R₁ is a mixture of alkenyl and/or alkyl radicals having from 14 to 22 carbon atoms, derived from tallow fatty acids;

- at least one quaternized hydroxyalkylcellulose polymer; and

- at least one polyorganosiloxane/polyoxyalkylene copolymer.

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Composition and process for the treatment and care of the hair.

The present invention relates to new cosmetic compositions for the treatment and care of the hair and to processes employing such composition.

It is well known that the hair is generally sensitized to various extents by the action of atmospheric agents, as well as by the action of treatments such as bleaching, permanent-waving and/or dyeing, so that the hair is often difficult to disentangle and to style.

One of the means generally employed for improving the disentangling and softness of the hair, sensitized or otherwise, comprises using surfactants which are cationic in nature.

Such agents have, however, the drawback of weighing down the hair and giving it a greasy appearance.

These drawbacks are particularly emphasized in the case of fine hair which lacks hold, liveliness and volume.

Rinsing compositions, such as those described in US - A - 4,144,326, based on cationic surfactants such as a mixture of dodecyltrimethylammonium and dialkyldimethylammonium chloride, the compositions being thickened with a quaternized cellulose, have already been recommended.

Some rinsing compositions of the prior art contain a quaternary ammonium salt in combination with a

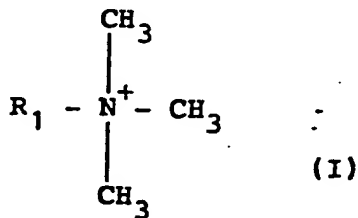
cationic cellulose to form a protective film on the hair, as described in JP-79/135,234.

All these compositions have, however, the disadvantage of weighing down the hair. In addition, hair treated with such rinsing compositions lacks body and liveliness after drying.

It has now surprisingly been discovered that, by combining a trimethylalkylammonium chloride, a quaternized hydroxyalkylcellulose polymer and a polyorganosiloxane/polyoxyalkylene copolymer, exceptional properties of body, hold and liveliness which were not possessed by earlier compositions are obtained on the hair.

Accordingly, the present invention provides a cosmetic composition suitable for application to the hair which comprises a cosmetically acceptable aqueous medium and

- at least one cationic surfactant of formula (I):



in which R_1 is a mixture of alkenyl and/or alkyl radicals having from 14 to 22 carbon atoms, derived from tallow fatty acids;

- at least one quaternized hydroxyalkylcellulose polymer; and

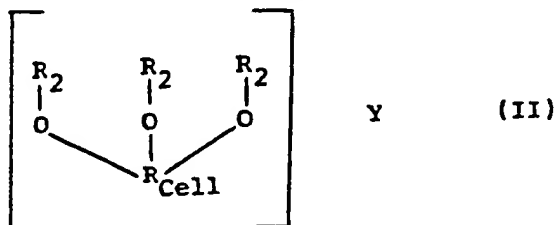
- at least one polyorganosiloxane/polyoxyalkylene

copolymer.

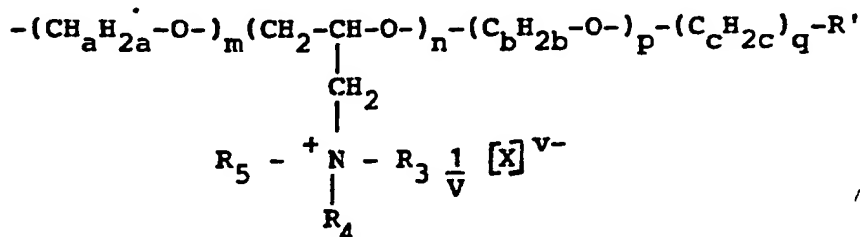
Suitable cationic surfactants of formula (I) include those sold by the company AKZO under the name ARQUAD, or by the company CECA PROCHINOR under the name NORAMIUM MS 50.

5 The quaternized hydroxyalkylcellulose polymer used according to the invention is typically either (1) a quaternary derivative of cellulose ether or (2) a copolymer of cellulose or cellulose derivatives grafted with a water-soluble quaternary ammonium monomer.

10 The quaternary derivative of cellulose ether, (1), suitably has a molecular weight of 100,000 to 3,000,000 and corresponds to the structural formula:



where R_{Cell} is the residue of an anhydroglucose unit, Y is 15 from 50 to 20,000, and each R_2 is individually a group of general formula:



where a is 2 or 3

b is 2 or 3

c is from 1 to 3;

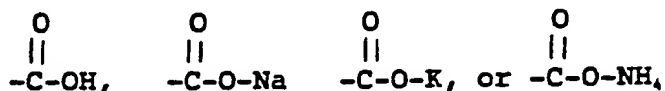
m is from 0 to 10;

5 n is from 0 to 3;

p is from 0 to 10;

q is 0 or 1;

R' is hydrogen or a radical of formula:



10 with the proviso that when q is zero, R' is hydrogen; R₃, R₄
and R₅ are each individually an alkyl, aryl, aralkyl,
cycloalkyl, alkoxyalkyl or alkoxyaryl radical, wherein each
of the radicals R₃, R₄ and R₅ comprises from 1 to 10 carbon
atoms, with the proviso (i) that, in the case of an
15 alkoxyalkyl radical, there are at least 2 carbon atoms
separating the oxygen atom from the nitrogen atom, and (ii)
that the total number of carbon atoms present in the
radicals R₃, R₄ and R₅ is from 3 to 12; or
R₃, R₄ and R₅, taken together with the nitrogen atom to
20 which they are attached, form a pyridine, α-methylpyridine,
3,5-dimethylpyridine, 2,5-dimethylpyridine, 2,4,6-trimethyl-
pyridine, N-methylpiperidine, N-ethylpiperidine,
N-methylmorpholine or N-ethylmorpholine group;
X is an anion; V is an integer equal to the valency of X;
25 the average value of n per anhydroglucose unit in this

cellulose ether is from 0.01 to 1, and the average value of $(m+n+p+q)$ per anhydroglucose unit in this cellulose ether is from 0.01 to 4;

Examples of preferred polymers include those
5 corresponding to the formula (II) above in which a and b are each 2, q is 0, R' is hydrogen, R₃, R₄ and R₅ are each methyl and X is chloride. The average values per anhydroglucose unit are 0.35 to 0.45 for n and 1 to 2 for the sum m+p.

10 Suitable ethers for use in the invention generally have viscosities at 25°C of 50 to 35,000 centipoises in aqueous solution at a concentration of 2% by weight, measured by ASTM method D-2364-65 (Brookfield model LVF viscometer, 30 rpm, spindle No. 2), and those which are
15 particularly suitable are those sold by the firm Union Carbide Corporation under the brand names "JR-125", "JR-400" and "JR-30M", which denote, respectively, a polymer of the type described above having a viscosity equal to 125 centipoises, 400 centipoises and 30,000 centipoises.

20 The copolymer of cellulose or cellulose derivative grafted with a water-soluble quaternary ammonium monomer, (2), is typically a hydroxyalkylcellulose grafted with a

methacryloylethyltrimethylammonium, methacrylamidopropyl-trimethylammonium or dimethyldiallylammonium salt. The salt is suitably a methosulphate or a halide, such as a chloride.

The hydroxyalkylcellulose is suitably hydroxymethyl-,
5 hydroxyethyl- or hydroxypropylcellulose.

One preferred embodiment of the invention comprises a copolymer of hydroxyethylcellulose grafted by a free-radical method with diallyldimethylammonium chloride, sold by the company NATIONAL STARCH under the name "CELQUAT L 200" or
10 "CELQUAT H 100".

The polyorganosiloxane/polyoxyalkylene copolymer used according to the invention is typically an alkoxyated polydi(C₁-C₄ alkyl)siloxane in which some of the di(C₁-C₄ alkyl)siloxane units are modified by substitution of one of
15 the alkyl groups with hydroxy(C₁-C₄ alkyl) groups.

Particularly suitable is an ethoxylated polydimethylsiloxane in which some of the dimethylsiloxane units are modified by the substitution of one of the methyl groups with 3-hydroxypropylmethyl groups, such as the products sold by the
20 company UNION CARBIDE under the name SILWET (TM). The molecular weight of these copolymers is from 500 to 10,000, generally from 550 to 6,000.

A preferred example of this type of silicone, for use according to the invention, is that sold by UNION CARBIDE
25 under the name SILWET 7600, the molecular weight of which is approximately 5,000.

The cationic surfactant of formula (I) is typically

used in a proportion of from 0.5 to 2.5% by weight relative to the total weight of the composition.

The quaternized hydroxyalkylcellulose polymer is typically used in a proportion of from 0.5 to 2.5% by weight
5 relative to the total weight of the composition.

The polyorganosiloxane/polyoxyalkylene copolymer is typically used in a proportion of from 0.4 to 3% by weight relative to the total weight of the composition.

A preferred embodiment of the invention comprises, in
10 a cosmetically acceptable aqueous medium:

- 0.7 to 2% by weight of cationic surfactant of formula (I);

- 1 to 28% by weight of cellulose ether polymer derived from quaternary ammonium, such as the product sold
15 by the company UNION CARBIDE under the name JR-4000; and

- 0.6 to 1% by weight of ethoxylated dimethylsiloxane/3-hydroxypropylmethylsiloxane copolymer, such as the product sold by the company UNION CARBIDE under the name SILWET
7600.

20 The cosmetic compositions suitable for application to the hair are typically presented in the form of an aqueous solution, thickened or otherwise, a cream, an emulsion, a gel, an aerosol foam or a spray.

The aqueous solutions comprise either water or a
25 water/solvent mixture. The solvents are suitably chosen from monohydric alcohols, polyhydric alcohols, glycol ethers and fatty acid esters. Lower alcohols such as ethanol, n-

propanol, isopropanol and n-butanol, polyhydric alcohols such as ethylene glycol, diethylene glycol and propylene glycol, and glycol ethers such as mono- or diethylene glycol alkyl ethers are particularly suitable.

5 These compositions typically comprise, in addition to essential components, other cationic surfactants and agents customarily used in cosmetics, such as perfumes, colourings, preservatives, sequestering agents, thickeners, emulsifiers, emollients and other adjuvants customarily used in hair-care
10 compositions. They do not contain active substances having detergent, wetting and foaming properties, enabling the hair to be cleansed.

When presented in thickened or gel form, the cosmetic compositions according to the invention comprise thickeners
15 in the presence or absence of solvents. The thickeners are suitably chosen from sodium alginate, gum arabic, cellulose derivatives such as methylcellulose, hydroxymethylcellulose, hydroxyethylcellulose, hydroxypropylmethylcellulose and carboxymethylcellulose, guar gum or its derivatives, xanthan
20 gum or scleroglucans. It is also possible to obtain a thickening of the compositions by mixing polyethylene glycol and polyethylene glycol stearate or distearate, or by a mixture of amide and phosphoric ester.

The concentration of thickener is suitably from 0.1 to
25 30% by weight, for example from 0.2 to 15% by weight, relative to the total weight of the composition.

The different cosmetic compositions for the treatment

and care of the hair are suitably presented under pressure, in an aerosol can, and used in the form of an aerosol foam. They are packaged in this case in the presence of one or more propellant gases.

5 The propellant gases used for pressurizing the cosmetic formulations are present in proportions not exceeding 25%, and preferably 15%, relative to the total weight of the composition. Suitable propellant gases comprise carbon dioxide, nitrogen, nitrous oxide, volatile
10 hydrocarbons such as butane, isobutane, propane and mixtures thereof, and non-hydrolysable chlorinated and/or fluorinated hydrocarbons such as, for example, those sold under the name "FREON" (Registered Trademark) by the company DU PONT DE NEMOURS and belonging, in particular, to the categories of
15 fluorochlorohydrocarbons such as dichlorodifluoromethane or "Freon" 12 and dichlorotetrafluoroethane or "Freon" 114. These propellants may be used alone or in combination; a mixture of Freon 114/12 in proportions varying between 40:60 and 80:20 is particularly suitable.

20 The pH of these compositions is generally adjusted with an alkalinizing or acidifying agent customarily used in the cosmetics field. The pH is generally from 3 to 10, depending on the application envisaged. It is adjusted using alkalinizing or acidifying agents that are well known
25 in the state of the art.

The cosmetic compositions are suitable for the treatment and care of the hair. A cosmetic treatment

denotes a treatment intended for improving the appearance, feel and shape of the hair.

The process for the cosmetic treatment of the hair, according to the invention, comprises applying to the hair a
5 cosmetic composition as defined above. Where appropriate, this application is followed by rinsing, after an exposure time of 1 to 30 minutes.

The cosmetic compositions according to the invention are typically used in a form to be rinsed before or after
10 shampooing, before or after dyeing or bleaching, before or after permanent-waving or straightening.

The examples which follow further illustrate the invention.

EXAMPLE 1

A transparent gel for dyed hair having the
15 following composition is prepared:

- Polymer of hydroxyethylcellulose
and epichlorohydrin, quaternized
with trimethylamine, sold by the
company UNION CARBIDE under the
20 name JR 400 1.8 g AS
- Hydroxyethylcellulose sold by the
company HERCULES under the name
NATROSOL 250 HHR 1.2 g AS
- Trimethylalkylammonium chloride
25 (alkyl = mixture of alkenyl and/or
alkyl radicals, having 14 to 22 carbon

- atoms, derived from tallow fatty acids),
sold by the company AKZO at a concentration of 30% AS in aqueous solution,
under the name ARQUAT T 30 1.8 g AS
- 5 - Ethoxylated copolymer of dimethylsiloxane/3-hydroxypropylmethyilsiloxane,
sold by the company UNION CARBIDE under
the name SILWET 7600 0.72 g AS
- 10 - Mixture of propylene glycol and 5-bromo-5-nitro-1,3-dioxane, sold by
the company HENKEL under the name
BRONIDOX L 0.3 g AS
- Perfume, colouring, preservative qs
- HCl qs pH 6
- 15 - Water qs 100.0 g

EXAMPLE 2

An after-shampoo to be rinsed, having the following composition, is prepared:

- 20 - Polymer of hydroxyethylcellulose and
epichlorohydrin, quaternized with
trimethylamine, sold by the company
UNION CARBIDE under the name JR 400 1.8 g AS
- Trimethylalkylammonium chloride
(alkyl = mixture of alkenyl and/or
25 alkyl radicals, having 14 to 22 carbon
atoms, derived from tallow fatty acids),
sold by the company AKZO under the name

- ARQUAT T 30 in aqueous solution at a
concentration of 30% AS) 1.5 g AS
- Distearyltrimethylammonium chloride 0.3 g AS
 - Mixture of cetylstearyl alcohol and
5 cetylstearyl alcohol oxyethylenated
with 33 moles of ethylene oxide, sold
by the company HENKEL under the name
SINNOWAX AO 2.0 g
 - Ethoxylated copolymer of dimethyl-
10 siloxane/3-hydroxypropylmethyilsiloxane,
sold by the company UNION CARBIDE
under the name SILWET 7600 0.72 g AS
 - Hydroxyethylcellulose sold by the
company HERCULES under the name
15 NATROSOL 250 HHR 0.5 g
 - Perfume, preservative, colouring qs
 - NaOH qs pH 6
 - Water qs 100.0 g

EXAMPLE 3

- 20 An after-shampoo lotion having the following
composition is prepared:
- CELQUAT L 200 sold by the company
NATIONAL STARCH 1.2 g
 - Trimethylalkylammonium chloride
25 (alkyl = mixture of alkenyl and/or
alkyl radicals, having 14 to 22 carbon
atoms, derived from tallow fatty acids),

- sold by the company AKZO at a concentration of 30% AS in aqueous solution, under the name ARQUAT T 30 2.0 g AS
- 5 - Ethoxylated copolymer of dimethylsiloxane/3-hydroxypropylmethyilsiloxane, sold by the company UNION CARBIDE under the name SILWET 7600 1.0 g
- Perfume, colouring, preservative qs
- HCl qs pH 6.5
- 10 - Water qs 100.0 g

This lotion is applied on washed and towel-dried hair. After rinsing with water, the wet hair disentangles readily, the dry hair is bouffant, soft and light and the styling possesses good hold.

15 EXAMPLE 4

An after-permanent-waving rinsing composition is prepared:

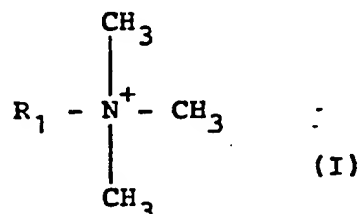
- CELQUAT H 100 sold by the company NATIONAL STARCH 1.0 g
- 20 - Trimethylalkylammonium chloride (alkyl = mixture of alkenyl and/or alkyl radicals, having from 14 to 22 carbon atoms, derived from tallow fatty acids), sold by the company AKZO
- 25 at a concentration of 30% AS in aqueous solution, under the name ARQUAT T 30 0.8 g AS
- Ethoxylated copolymer of dimethyl-

- siloxane/3-hydroxypropylmethyilsiloxane,
sold by the company UNION CARBIDE under
the name SILWET 7600 0.6 g
- 5 - Mixture of cetylstearyl alcohol and
cetylstearyl alcohol oxyethylenated
with 33 moles of ethylene oxide, sold
by the company HENKEL under the name
SINNOWAX AO 3.0 g
- 10 - Cetylstearyl alcohol oxyethylenated
with 15 moles of ethylene oxide 1.5 g
- Pure cetyl alcohol 1.5 g
- Triethanolamine qs pH 5.5
- Water qs 100.0 g
- 15 This milk, applied after permanent-waving,
enables ready disentangling of the wet hair and a good
recovery of curl to be obtained after rinsing.
- The dried hair is shiny, soft, smooth and lively.

CLAIMS

1. A cosmetic composition suitable for application to the hair which comprises a cosmetically acceptable aqueous medium and

- at least one cationic surfactant of formula (I):



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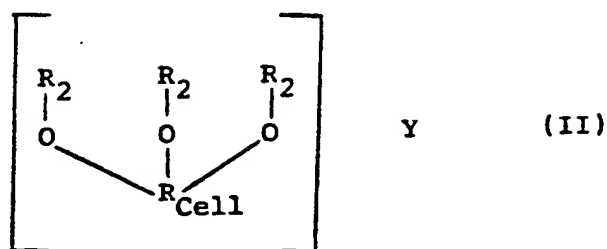
in which R_1 is a mixture of alkenyl and/or alkyl radicals having from 14 to 22 carbon atoms, derived from tallow fatty acids;

- at least one quaternized hydroxyalkylcellulose polymer; and

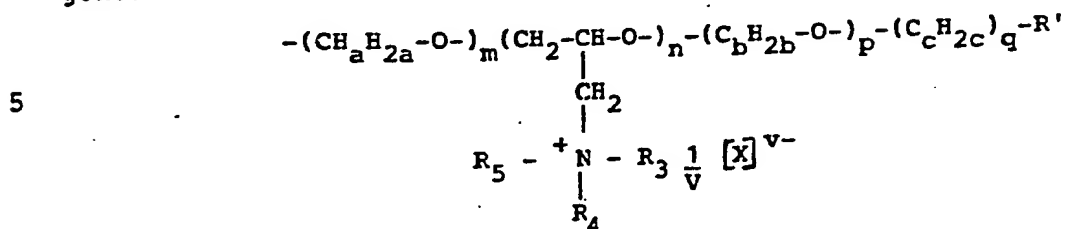
- at least one polyorganosiloxane/polyoxyalkylene copolymer.

2. A composition according to Claim 1 in which the quaternized hydroxyalkylcellulose polymer is a quaternary derivative of cellulose ether or a copolymer of cellulose or cellulose derivative grafted with a water-soluble quaternary ammonium monomer.

3. A composition according to Claim 2 in which
(1) the quaternary derivative of cellulose ether corresponds to the formula:



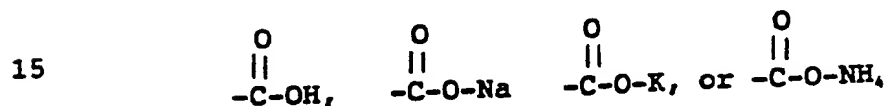
where R_{Cell} is the residue of an anhydroglucose unit, Y is from 50 to 20,000, and each R_2 is individually a group of general formula:



where

- a is 2 or 3;
- b is 2 or 3;
- c is from 1 to 3;
- m is from 0 to 10;
- n is from 0 to 3;
- p is from 0 to 10;
- q is 0 or 1;

R' is hydrogen or a radical of formula:



with the proviso that when q is zero, R' is hydrogen; R_3 , R_4 and R_5 are each individually an alkyl, aryl, aralkyl, cycloalkyl, alkoxyalkyl or alkoxyaryl radical, wherein each of the radicals R_3 , R_4 and R_5 comprises from 1 to 10 carbon atoms, with the proviso (i) that, in the case of an

- alkoxyalkyl radical, there are at least 2 carbon atoms separating the oxygen atom from the nitrogen atom, and (ii) that the total number of carbon atoms present in the radicals R_3 , R_4 and R_5 is from 3 to 12; or
- 5 R_3 , R_4 and R_5 , taken together with the nitrogen atom to which they are attached, form a pyridine, α -methylpyridine, 3,5-dimethylpyridine, 2,5-dimethylpyridine, 2,4,6-trimethylpyridine, N-methylpiperidine, N-ethylpiperidine, N-methylmorpholine or N-ethylmorpholine group;
- 10 X is an anion; V is an integer equal to the valency of X; the average value of n per anhydroglucose unit in this cellulose ether is from 0.01 to 1, and the average value of (m+n+p+q) per anhydroglucose unit in this cellulose ether is from 0.01 to 4;
- 15 (2) the copolymer of cellulose or cellulose derivative grafted with a water-soluble quaternary ammonium monomer is a graft copolymer of hydroxyalkylcellulose and a methacryloyltrimethylammonium salt, -a methacrylamidopropyltrimethylammonium salt or a dimethyldiallylammonium salt.
- 20 4. A composition according to any one of Claims 1 to 3 wherein the polyorganosiloxane/polyoxyalkylene copolymer is an alkoxylated polydi(C_1 - C_4 alkyl) siloxane, unsubstituted or substituted on one of the C_1 - C_4 alkyl groups by one or more hydroxy (C_1 - C_4 alkyl) groups.
- 25 5. A composition according to Claim 4 wherein the polyorganosiloxane/polyoxyalkylene copolymer is an ethoxylated copolymer of dimethylsiloxane/3 hydroxypropyl-

methyl siloxane.

6. A composition according to any one of Claims 1 to 5 which comprises from 0.5 to 2.5% by weight, relative to the total weight of the composition, of the cationic surfactant of formula (I) as defined in Claim 1.

7. A composition according to any one of Claims 1 to 6 which comprises from 0.5 to 2.5% by weight, relative to the total weight of the composition, of quaternized hydroxy-alkylcellulose polymer.

8. A composition according to any one of Claims 1 to 7 which comprises from 0.4 to 3% by weight, relative to the total weight of the composition, of polyorganosiloxane/polyoxyalkylene copolymer.

9. A composition according to any one of Claims 1 to 8 which is presented in the form of an aqueous solution, thickened or otherwise, a cream, a gel, an aerosol foam or a spray.

10. A composition according to any one of Claims 1 to 9 which includes perfumes, colourings, emulsifiers, thickeners, sequestering agents, emollients, other cationic surfactants or any other adjuvant customarily used in hair-care formulations.

11. A composition according to Claim 10 in which the thickener is present in a concentration of from 0.1 to 30% by weight relative to the total weight of the composition and comprises sodium alginate or gum arabic, a cellulose derivative, guar gum or a derivative thereof, xanthan gum or

scleroglucan.

12. A composition according to any one of Claims 1 to 11 in which the pH is from 3 to 10.

13. A composition according to any one of Claims 1 to 5 12 which is packaged under pressure, in an aerosol device, to form a foam at the time of expulsion from the aerosol device.

14. A composition according to Claim 13 which is packaged in the presence of a propellant gas which comprises 10 carbon dioxide, nitrogen, nitrous oxide, volatile hydrocarbons or a non-hydrolysable fluorinated and/or chlorinated hydrocarbon and which is present in a proportion not exceeding 25% relative to the total weight of the composition.

15 15. A composition according to Claim 1 and substantially as hereinbefore described in any one of Examples 1 to 4.

16. A process for the cosmetic treatment of the hair which comprises applying to the hair a composition as 20 claimed in any one of Claims 1 to 15.

17. A process according to Claim 16 wherein the composition is left on the hair for up to 30 minutes and then rinsed off.

18. A process according to Claim 16 or 17 which 25 comprises applying the composition in a form to be rinsed before or after shampooing, before or after dyeing or bleaching, before or after permanent-waving or

straightening.

19. A process according to Claim 16 and substantially as hereinbefore described.